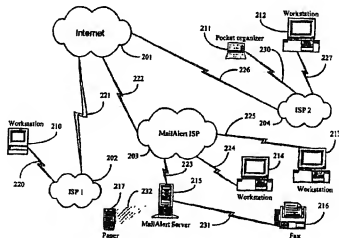




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : G06F 13/00		A1	(11) International Publication Number: WO 98/00787
			(43) International Publication Date: 8 January 1998 (08.01.98)
(21) International Application Number:	PCT/US97/12932		
(22) International Filing Date:	30 June 1997 (30.06.97)		
(30) Priority Data:	08/673,350	28 June 1996 (28.06.96)	US
(71) Applicant:	DATALINK SYSTEMS CORPORATION [US/US]; Suite 240, 2105 Hamilton Avenue, San Jose, CA 95125 (US).		
(72) Inventor:	ZAHARIEV, Manuel; 102-6688 Burlington Avenue, Burnaby, British Columbia V6G 2Z6 (CA).		
(74) Agent:	BOYS, Donald, R.; P.O. Box 187, Aromas, CA 95004 (US).		
		(81) Designated States: CA, CN, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: ELECTRONIC MAIL SYSTEM FOR RECEIVING AND FORWARDING E-MAIL MESSAGES BASED ON SUBSCRIBER SUPPLIED CRITERIA



(57) Abstract

An e-mail system implemented on a server (215) having a network connection (220, 222, 223, 226, 227) receives and forwards e-mail messages based on subscriber-supplied criteria. When a message is received addressed to the subscriber (210, 212, 213, 214), characteristics of the message, such as existence of and size of attachments, are compared to characteristics previously supplied by the subscriber. If a match is found, the subscriber is notified, such as by a page to a pager (217) carried by the subscriber, of the message and the nature of the match. Facility is provided at the server for the subscriber to then call the server, log on, and provide instructions for forwarding the matched message. Forwarding may be to such as handheld device or a notebook computer (221) operated by the subscriber, or to a mailbox of mailboxes on other servers, or any combination. A subscriber is then in control of points of delivery of incoming e-mail messages.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Morocco	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

ELECTRONIC MAIL SYSTEM FOR RECEIVING AND FORWARDING E-MAIL MESSAGES BASED
ON SUBSCRIBER SUPPLIED CRITERIA

5

Field of the Invention

The present invention is in the area of network document
10 services, and pertains more particularly to an electronic mail (e-mail)
service utilizing machine-intelligent filters to determine forwarding and
notification for receipt of e-mail.

Background of the Invention

15

The public network system over telephone lines known as the
Internet, and particularly the portion of the Internet known as the World
Wide WEB (WWW) has experienced rapid growth, and with this growth
all sorts of electronic document services have been developed and
20 provided to users. E-mail is arguably the most familiar of these services,
and is provided by every Internet Service Provider (ISP) and in other
ways as well. E-mail services may also be provided on other networks,
such as Wide Area Networks (WANs) and the like.

Even though e-mail services have become commonplace and
25 reliable, there are still some limitations. For example, e-mail services
typically require the user to actively look up whether he or she has
received e-mail, unless the user is permanently connected to the
Internet. In some service packages, e-mail is delivered to a mobile
device, like a palmtop-computer or a telephone. However costs in such
30 systems are high per message and size, and if the user has no facility to
review and veto delivery, he or she may receive attachments of several
dozen kilobytes or even more incurring very high delivery costs. What

2

is clearly needed is a smart filter system that operates firstly to decide, based upon certain criteria set up by the user, if, when e-mail is received, the user is to be notified by pager or similar services, and secondly if and where to forward mail. Such an enhancement in e-mail services allows
5 the user to avoid being disturbed by unimportant messages, as well as to avoid high costs of unsolicited and or unwanted mail reception on expensive wireless systems or other remote systems.

10

Summary of the Invention

In a preferred embodiment, a system for receiving and forwarding e-mail messages for a subscriber is provided. The system comprises a server connected to a network; and a Mail Alert code set
15 resident and operable on the server. The MailAlert code set is adapted to compare characteristics of e-mail messages received for the subscriber to specific message characteristics provided by the subscriber and pre-stored on the server, to send a message to the subscriber when a characteristic match is found, and to execute following instructions from
20 the subscriber for forwarding of the message received for which a match was found. In one embodiment the message sent to the subscriber on finding a characteristic match is sent to a pager carried by the subscriber.

On receiving a page that a matched message has been intercepted, the server running the MailAlert code set waits for
25 instructions from the subscriber. The subscriber may call in, log in by such as name and password, and then select specific forwarding for the intercepted and matched message. Forwarding may be to any or any combination of a number of devices capable of receiving the e-mail message. The subscriber, for example, may have the message forwarded

3

to a hand-held or notebook computer carried and operated by the subscriber, and also to a postoffice on another server or ISP

In various embodiments of the invention facility is thus provided for a subscriber to avoid having long messages sent to a remote device, such as a hand-held computer or notebook computer, and may thereby gain cost control over such message transfers. Another distinct advantage is that the subscriber, in the case of Internet services, becomes once-removed from his own Internet Service Provider (ISP), and can then change providers and e-mail systems, and still receive his e-mail seamlessly, and may have mail delivered to several places or any combination. A user may, for example, simply supply a criteria that all mail be intercepted and held for later instructions, and thereby gain control of delivery points.

15 Brief Description of the Drawing Figures

Fig. 1A is a first of two portions of an example of software, in pseudo code, as it might be used in a preferred embodiment of the present invention.

20 Fig. 1B is a second portion of an example of software, in pseudo code, as it might be used in a preferred embodiment of the present invention.

Fig. 2 shows a system topology including interconnection of all units in a preferred embodiment of the present invention.

25

Description of the Preferred Embodiments

4

In a preferred embodiment a server is used, connected to a network such as the Internet as well as to the phone system to perform the required functions of the invention

As can be seen from the Figures and as described below, most of the implementation of embodiments of the present invention is in interconnection of apparatus, and in integration of the apparatus by unique software resident and executed on a server. It will be apparent to those with skill in the art that there are many ways to partition such a system, and both the topology and the software partition can be changed substantially without really changing the resulting function of the complete system. Therefore the following descriptions have to be viewed as only one embodiment among many possible embodiments .

In Figs. 1A and 1B, a rich pseudo code is used to illustrate how the core software is built, with addition of most-used modules. Lines 106 through 114 define the program objects. Lines 119 through 158 show a list of concurrent and invoked tasks. In line 106 MailAlert is defined as the principle code routine in the embodiment described. Mail Server described in line 108 could be a basic version of UNIX™ SendMail, a widely used standard mail software. SendMail does receive mail from the Internet, typically using Simple Mail Transfer Protocol(SMTP).

In the embodiment described herein of the present invention, when e-mail is received, a copy is typically forwarded to the customer's normal base address. A copy is also retained on the server, which is then analyzed by the MailFilter code routine on line 110. A match of pre-programmed criteria with mail message characteristics generates an Alert, which on Line 111 is used to generate a page to a paging unit carried by the subscriber. Additionally, each page is complemented with a unique ID stamp for identification. In line 113 and 114 the subscriber can request either a fax back or a forwarding of the specific message by

5

phone using the id stamp from line 112. That could happen in several ways. In one instance, the user would call an operator, identify himself, tell the operator the ID stamp of the requested message, and tell also the means, fax, e-mail or similar, and location of the forwarding, by e-mail address, fax number or similar. In the other instance, he would call into a voice-response system, identify himself by either touching or speaking his customer id, then entering the message ID stamp, and then selecting one of several pre-selected destinations, or enter a method and an address again by means of touching or speaking.

Procedure MailAlert on lines 119 through 127 basically repeats all basic steps indefinitely. In line 121 are the tasks of Receive, Forward and Store Mail, which can be handled by standard packages such as SendMail of UNIX™. Other similar products can be substituted, or modified or adapted to perform in the desired manner.

In line 133, a Filter Mail procedure filters new incoming mail, then looks up the customer for whom it was received in the customer database, gets stored customer records including pre-stored e-mail filtering criteria, and checks for a match, storing relevant results in the alert table.

In line 138 the task SendAlerts is continuously taking record by record from the AlertTable and emptying into paging systems, according to instructions stored in that record by FilterMail from the customer record.

The task MailAlert Auto Attendant on lines 144-149 takes customer calls, and based on customer ID and Alert ID then does either a fax or mail forward of the relevant messages. Optionally, attachments can be included to be expanded or dropped.

The task MailAlert Fax Back Server is then used to actually work off the queue of faxes to be sent to customers.

6

Fig. 2 shows how a typical topology might look in a preferred embodiment of the present invention. A mail sender can be sending e-mail from workstation or PC 210, via Internet connection 220 to Internet Service Provider (ISP) 202. Although in this example the connection is through the well-known Internet, practice of the present invention is not limited to use with the Internet. The MailAlert system of the invention may be practiced wherever e-mail is used, regardless of the nature of the Network. The Internet is exemplary. The mail is then forwarded via link 221 to "backbone" 201, and on to MailAlert ISP 203 via connection 222 to the backbone. Inside MailAlert ISP the mail is received by Server 215 via connection 223 from the subnet 203. The MailAlert software then forwards a copy to the subscriber (If we call the same person both subscriber and customer, confusion is sure to result. on workstation 212, via connection 227, the subscriber's ISP 204, connection 226, backbone 201, connection 222, MailAlert ISP 203 and connection 223. At the same time, if a match between criteria and message characteristics is found, the system alerts via telephone and paging network 232 the subscriber's pager 217. The subscriber then can call in and have the message forwarded to fax 216 via telephone network connection 231, or he can have it forwarded to an alternate mail address, in this example is represented by pocket organizer 211, which has a wireless link to ISP 204. That (what is "that") then connects in normal manner from server 215.

If the subscriber has Internet service from the same ISP as MailAlert, he could connect like workstation 213 via connection 225.

The here-presented system provides an ability to selectively filter information based on e-mail, and to notify a subscriber of availability of such selected information, giving the subscriber the subscriber an option to have the message forwarded either by e-mail or fax to a specific location. For example, if a subscriber expects a

7

document as an attachment by e-mail, but is only interested in comments contained in the copy (body) of the message, he may setup a filter as following: Filter1:Sender=

- XYZ:Subject=ABC:Attachment=Yes; . This Filter would tell the filter software to look for matches in this subscriber's incoming mail. Once a message is received that matches the criteria, the subscriber will receive a page that could look like : MsgID=1234, Filter1. The subscriber then can call the Auto Attendant and identify himself with Customer ID and password, upon which he will be prompted to enter the message ID.
- Next he can select means of delivery, like e-mail or fax, and then enter numbers or addresses, or select one of a limited set of preprogrammed numbers or addresses.

- After the subscriber makes all of the needed selections and entries, the system will immediately start to process his request, and within seconds delivery should begin. Alternatively, instead of using a pager, many models of new digital phones have paging facilities, so the message could include the call back number, which can be dialed in single button access. In another embodiment two-way pagers may be used to allow selecting immediate forwarding based on preprogrammed numbers or addresses.

- In yet another embodiment, mail messages or parts of mail messages meeting certain criteria can be included with the notification message. It will be apparent to those with skill in the art that there are many alterations that may be made in the embodiments described herein without departing from the spirit and scope of the invention. For example, programming of the filter criteria can be achieved in any one of several ways, all of which should be familiar to those with skill in the art. Programming of all of the several functional modules of the Mail Alert System according to embodiments of the invention can be done in many different ways, according to individual preferences of

8

programmers, while falling within the scope of the invention. Moreover, there are alternatives that may be taken in hardware connection, also while falling within the spirit and scope of the invention. The invention, therefore, is defined by the scope of the following claims.

What is claimed is:

1. A system for receiving and forwarding e-mail messages for a subscriber. the system comprising:
 - 5 a server connected to a network; and
 - a Mail Alert code set resident and operable on the server; wherein the MailAlert code set is adapted to compare characteristics of e-mail messages received for the subscriber to specific message characteristics provided by the subscriber and pre-stored on the
 - 10 server, to alert the subscriber when a characteristic match is found, and to execute following instructions from the subscriber for forwarding of the message received for which a match was found.
2. A system as in claim 1 wherein the subscriber is alerted on finding a
- 15 characteristic match by sending a page to a paging device carried by the subscriber.
3. A system as in claim 1 further comprising a human interface whereby an operator causes received and matched mail to be forwarded to mail
- 20 addresses provided by the subscriber responding to the alert by conversing with the operator via telephone.
4. A system as in claim 1 further comprising a telephone menu system whereby a subscriber, responding to an alert, may log in, identify
- 25 messages, select from recorded options, and input information for forwarding of identified messages.
5. An e-mail server comprising:
 - an e-mail system adapted for receiving and forwarding e-mail;
 - 30 and

10

- a Mail Alert system adapted to compare characteristics of e-mail messages received for the subscriber to specific message characteristics provided by the subscriber and pre-stored on the server, to alert the subscriber when a characteristic match is found, and to execute
- 5 following instructions from the subscriber for forwarding of the message received for which a match was found.
6. An e-mail server as in claim 5 wherein the subscriber is alerted on
- 10 finding a characteristic match by sending a page to a paging device carried by the subscriber.
7. An e-mail server as in claim 5 further comprising a human interface whereby an operator causes received and matched mail to be forwarded
- 15 to mail addresses provided by the subscriber responding to the alert by conversing with the operator via telephone.
8. An e-mail server as in claim 5 further comprising a telephone menu system whereby a subscriber, responding to an alert, may log in, identify
- 20 messages, select from recorded options, and input information for forwarding of identified messages.
9. A method for receiving, filtering, and routing e-mail messages, comprising steps of:
- 25 (a) prerecording on a mail server characteristics for messages to be routed, the characteristics provided by a subscriber;
- (b) receiving messages addressed to the subscriber at the mail server;
- (c) comparing characteristics of messages received to the
- 30 prerecorded characteristics provided by the subscriber;

11

(d) identifying and storing on the mail server messages received for the subscriber for which a match is found to the prerecorded characteristics;

(e) alerting the subscriber to the receipt of one or more messages for which a characteristic match is found; and

(f) forwarding the stored messages for which a match is found to destinations provided by the subscriber in response to the alert.

10. The method of claim 9 wherein, in the alerting step, a page is sent to a pager carried by the subscriber to alert the subscriber to the receipt of the one or more messages.

11. The method of claim 9 wherein, in the forwarding step, an operator enters destinations provided by the subscriber by telephone conversation in response to the alert, and causes the one or more messages to be forwarded.

12. The method of claim 9 wherein, in the forwarding step, a subscriber, in response to the alert, interacts with a phone menu system, identifying messages and selecting destinations for forwarding.

13. A machine-intelligent agent for processing e-mail messages, comprising:

- a stored list of message characteristics provided by a subscriber;
- a receiver adapted for receiving e-mail messages and ascertaining message characteristics of the received messages;
- a comparator adapted for comparing characteristics of received messages with stored characteristics, and tagging those messages wherein the characteristics match; and

12

a save facility adapted for storing matched messages against future distribution instructions.

14. The machine-intelligent agent of claim 13 further comprising an alert mechanism for alerting a subscriber to the receipt of messages having characteristics matching the stored characteristics.

15. The machine-intelligent agent of claim 14 wherein the alert mechanism comprises a pager transmitter adapted for transmitting a pager signal to a pager carried by the subscriber.

16. The machine-intelligent agent of claim 14 further comprising a forwarding facility for retrieving and forwarding stored messages to destinations provided by the subscriber in response to the alert.

17. The machine-intelligent agent of claim 16 wherein the forwarding facility comprises a human interface for identifying messages to be retrieved, retrieving the identified messages, and forwarding the identified messages to destinations provided to an operator by the subscriber.

18. The machine-intelligent agent of claim 16 wherein the forwarding facility comprises an automated telephone menu system adapted for providing choices to a subscriber connecting to the forwarding facility by telephone, wherein the subscriber calling in may identify stored messages to be forwarded, and the agent retrieve and forward the identified messages to destinations provided by the subscriber callin in response to the alert.

**Fig. 1A - Pseudo Code Representation of Application
Software in MailAlert Server**
annotated for better understanding

100
101 **Bold** = objects
102 *Italic* = actions (methods, code members)
103
104 **Core**
105
106 MailAlert ISP 203 is the provider of the **MailAlert** (software on server 215) service.
107 **MailAlert** relies on a **Mail Server** (software on server 215) package for **Mail**
 processing.
108 The **Mail Server** receives **Mail** for **Customers** (e.g. message sent by 210) and forwards
 it to their permanent mail address (e.g. Workstation 212 on ISP2 204), also *stores* a **Mail**
 Copy (on server 215).
109 An **Alert** (e.g. data content of pager message) is a basic information provided by
 MailAlert to **Customers** (e.g. using pager 217 via paging network 232).
110 The **Mail Filter** (also software on server 215) *analyzes* the **Mail Copy** (content of e-
 mail message), looking for Interest Criteria (in database on server 215). When a
 match is found, an **Alert** is generated.
111 **Alerts** are records in an **Alert Table** (also database on server 215). For each **Alert**
 Record, a **Pager Message** will be generated using **Sends Alerts** (software on server
 215).
112 Every **Alert** is stamped with a unique identifier for the **Customer** receiving it.
113 A **Customer**, using the **Alert** identifier can *request* from a **MailAlert Auto Attendant**
 the whole contents of the **Mail Copy** to be faxed to them (on Fax machine 216) or
 forwarding to a special e-mail address (e.g. mobile device 211). The **MailAlert Auto**
 Attendant will *add* a **Fax Back Record** into a **Fax Back List** (database on server 215).
114 For each **Fax Back Record**, a **Fax Message** will be generated and send using a **Fax**
 Back Server (software on server 215).
115
116
117 **Procedures**
118
119 Concurrent tasks in service **MailAlert** are
120 {
121 Receive, Forward Mail; Store Mail Copies
122 Filter Mail Copies
123 Send Alerts
124 MailAlert Auto Attendant
125 MailAlert Fax Back Server
126 MailAlert Mail Redirector
127 }
128
129
130 task Receive, Forward Mail; Store Mail Copies is
131 provided by third party Mail Server package for release 1.0

Fig. 1B - Pseudo Code Representation of Application Software in MailAlert Server (Continued)

```

132
133 task Filter Mail Copies is
134     forever
135         Wait For New MailCopy
136         MailCopy :: GetCustomer() :: FindMatchAlertCriteria( MailCopy,
AlertTable )
137
138 task Send Alerts is
139     forever
140         if not AlertTable :: isEmpty() then
141             AlertTable :: currentRecord :: SendAlert()
142             AlertTable :: currentRecord :: delete
143
144 task MailAlert Auto Attendant is
145     forever
146         Wait For Customer Call
147         Request Parameters( Customer Id, Alert Id, Fax/Mail )
148         if Fax then FaxBackList :: AddFaxBackRecord( CustomerId, AlertId )
149         if Mail then Forward (CustomerId, AlertId, AltMailAdd )
150
151
152
153
154
155 task MailAlert Fax Back Server is
156     forever
157         if not FaxBackList :: isEmpty() then
158             FaxBackList :: FirstRecord() :: GenerateFax()

```

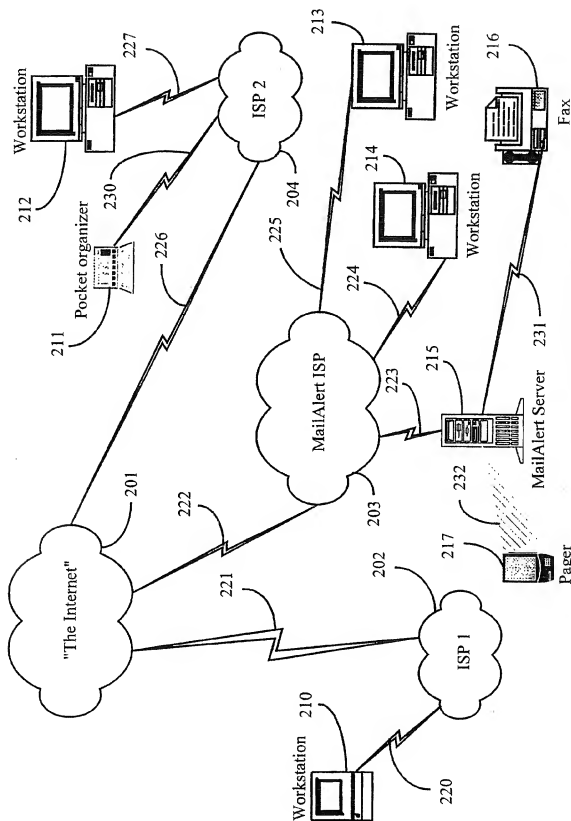



Fig. 2 - Topology Example

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/12932

A. CLASSIFICATION OF SUBJECT MATTER IPC(6) : G06F 13/00 US CL : 395/200.36; 379/100.08 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 395/186, 200.36, 200.37, 200.47, 200.53, 200.68, 201, 800.01; 379/67, 90.01, 100.05-100.08; 455/31.1, 412 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched NONE Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Extra Sheet.		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,487,100 A (KANE) 23 January 1996, see abstract and column 1, line 65 - column 2, line 38.	1-18
X	US 5,483,466 A (KAWAHARA ET AL.) 09 January 1996, see abstract and column 2, line 20 - column 6, line 1.	1-18
A	US 5,377,354 A (SCANNELL ET AL.) 27 December 1994, see abstract and column 2, line 34 - column 3, line 11.	1-18
A	US 5,265,033 A (VAJK ET AL.) 23 November 1993, see abstract and column 1, line 60 - column 2, line 68.	1-18
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "B" earlier document published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "A" document member of the same patent family		
Date of the actual completion of the international search 09 OCTOBER 1997		Date of mailing of the international search report 17 NOV 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer ALPESH M. SHAH Telephone No. (703) 305-9698

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/12932

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,040,141 A (YAZIMA ET AL.) 13 August 1991, see abstract and column 2, lines 14-41.	1-18

Form PCT/ISA/210 (continuation of second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/12932

B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

APS

Searched Terms: electronic or e-mail, client/user/subscriber/customer, servers, networks, comparator, packets or messages etc.